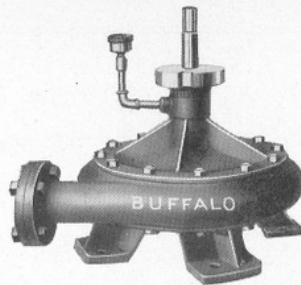


BUFFALO

Vertical Shaft
Centrifugal Pumps



Bulletin 951

Buffalo Steam Pump Co.
Buffalo, N. Y.

New York
Boston
Philadelphia
Pittsburgh

Cleveland
Detroit
Chicago
St. Louis
Los Angeles

New Orleans
Atlanta
Minneapolis
Denver

Canadian Blower & Forge Co., Ltd.
Kitchener, Ont., Canada

Toronto

Montreal

Calgary

Vancouver

St. John.

Buffalo Vertical Shaft Centrifugal Pumps

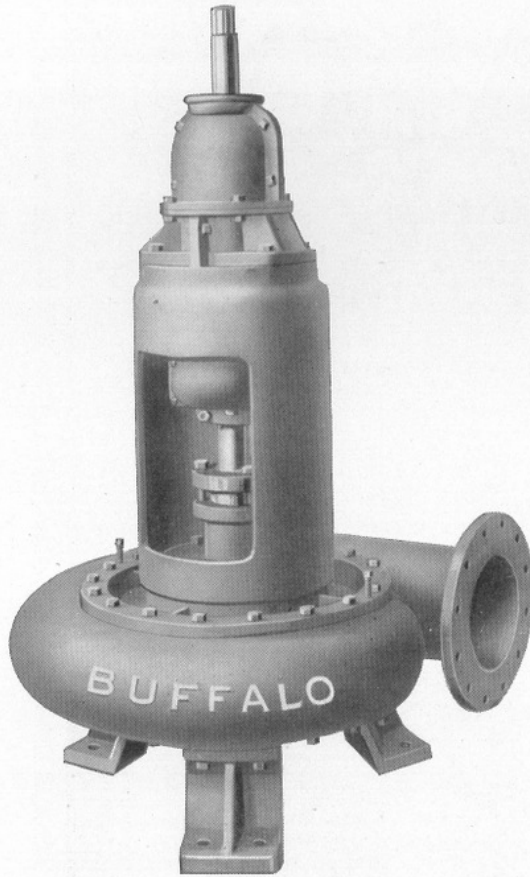


Fig. 1012
Vertical Non-Submerged Centrifugal Pump

Buffalo Vertical Pumps can be furnished either for submerged or non-submerged operation, and bearings and couplings will be designed accordingly. A non-submerged pump has the thrust bearing mounted directly on the pump casing, while a submerged pump installation has the thrust bearing separate, above the level of the water.

Buffalo Vertical Shaft Centrifugal Pumps owe their successful operation to the care with which they are designed and built to meet actual operating conditions. Every installation has the special attention of our engineering department.

Buffalo Vertical Pumps are successfully handling water, brine, sewage and chemical solutions. These pumps can be built for small or large capacities, low or high heads, and with either short or long shafts between pump and power end.

Vertical Shaft Pumps are generally used where the floor space available is very limited, or where it is desired to place pump below the level of the liquid, or where suction lift would be too high for a horizontal pump placed at ground level.

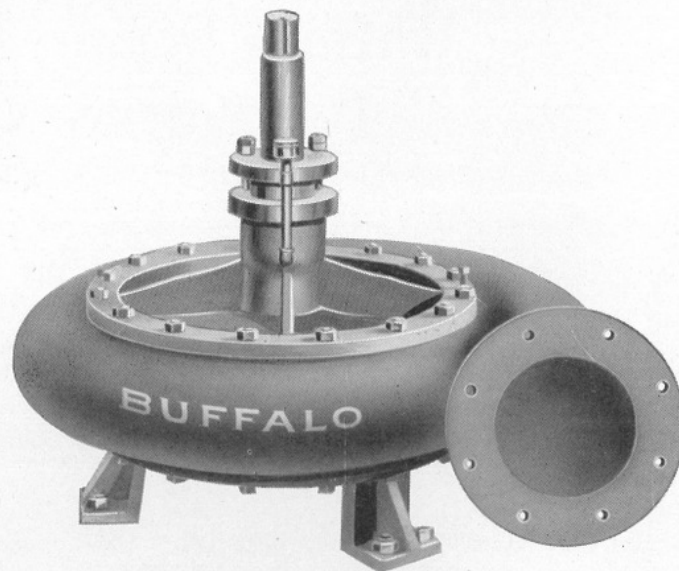


Fig. 991
Vertical Submerged Centrifugal Pump

Thrust and Shaft or Guide Bearings are automatically lubricated and designed for continuous service, at either high or low speeds. The Multi-Rubber Cylinder Type of Flexible Coupling is especially suitable for vertical shaft installations.

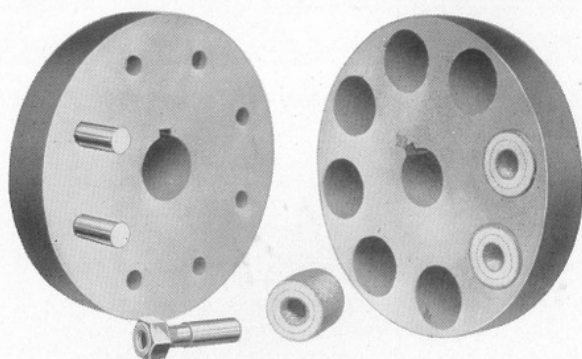


Fig. 998

Buffalo Flexible Coupling of the Multi-Rubber Cylinder Type

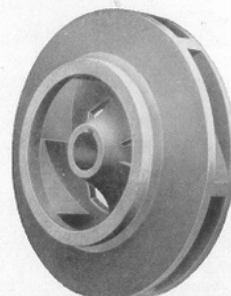


Fig. 910

Single Suction Enclosed Type Impeller

When submitting inquiries state whether pump is pulley or motor driven, and if motor driven details of electrical current. Also advise nature of liquid being handled, capacity in gallons per minute, total head in feet and whether pump is for submerged or non-submerged operation.

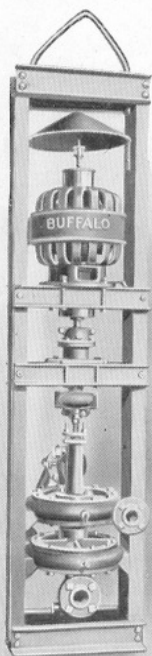


Fig. 954

Vertical Shaft Sinking Pump

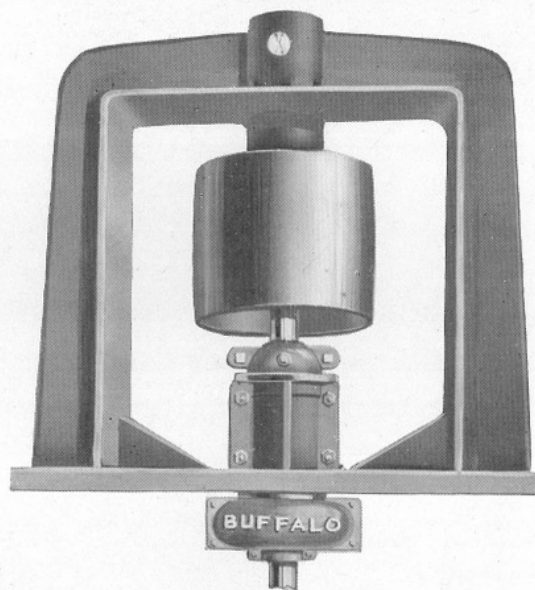


Fig. 997

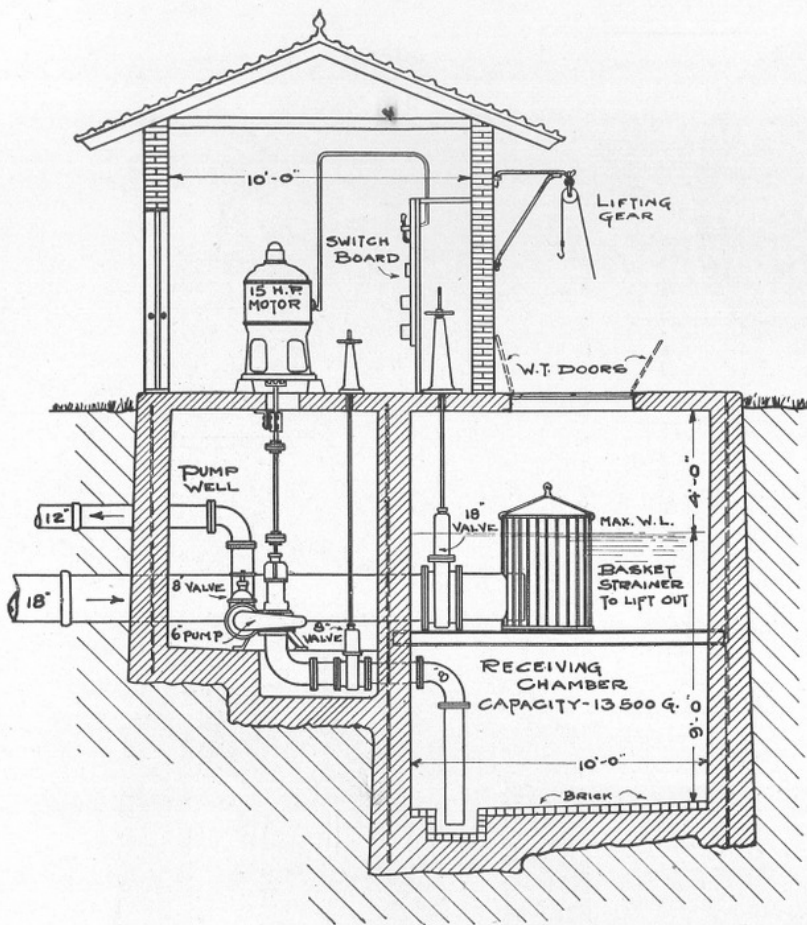
Pulley Frame for Vertical Shaft Pumps—Quarter Turn Belt

5 in. and smaller pumps have pulley as shown.

6 in. and larger pumps have pulley with bottom flange.

Buffalo Vertical Pumps can also be built in two stages for higher heads. Sinking Pumps as shown in Fig. 954 are furnished in either single or compound units.

Buffalo Vertical Shaft Centrifugal Sewage Pumps



Typical Installation for Sewage Disposal



Fig. 1203
Semi-Open Sewage Type Impeller

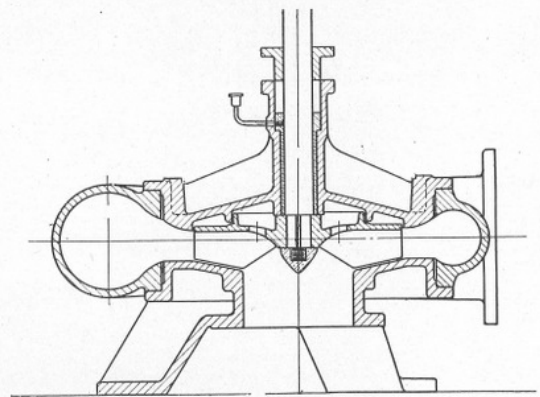


Fig. 1205
Sectional View—Vertical Submerged Pump
with Sewage Type Impeller

One of the widest uses for Vertical Shaft Pumps is handling sewage. Practically all Sewage Pump installations are made with pump below level of liquid, so pump is always self-priming. With electric drive and automatic control, the outfit requires practically no attention except occasional oiling of bearings.

Buffalo Sewage Pumps have a special type of impeller as shown in Fig. 1203. This impeller is built open on one side and the edges of the blades are machined. When this impeller is assembled in the pump, Fig. 1205, the blades have very close clearance with the suction side plate, which is machined to suit the blades. This design prevents clogging and tends to break up solid matter entering the pump. Impeller may have three, four or five blades depending on size of pump. Male and female fit is provided between casing and side plates.

We do not recommend smaller than a 4" pump for handling raw, unscreened sewage. Buffalo Sewage Pumps can be built horizontal as well as vertical.

Vertical Shaft Bearings

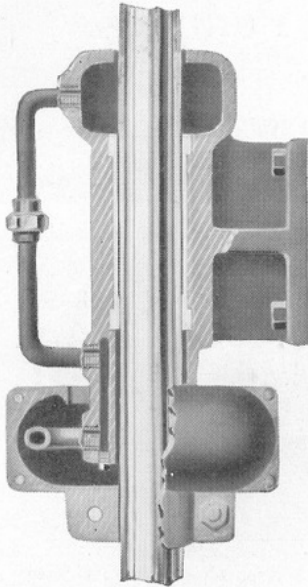


Fig. 995
Vertical Shaft Guide Bearing

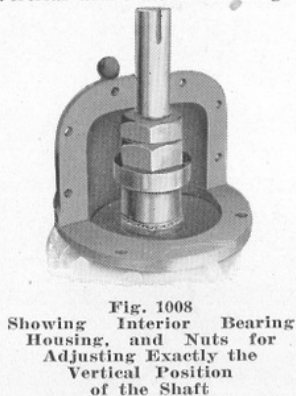


Fig. 1008
Showing Interior Bearing
Housing, and Nuts for
Adjusting Exactly the
Vertical Position
of the Shaft

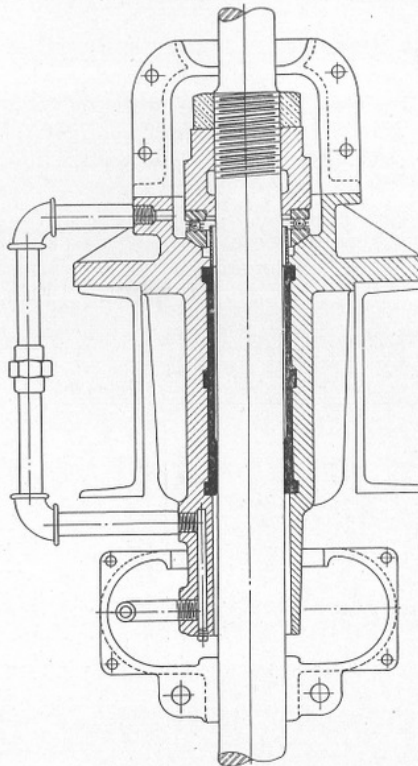


Fig. 1032
Vertical Shaft Thrust Bearing—
Sectional View

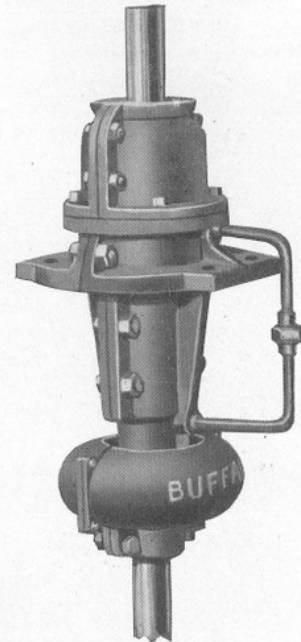


Fig. 1031
Vertical Shaft Thrust Bearing

Buffalo Thrust Bearings:—In the Buffalo Thrust Bearing, the weight of rotating parts is carried on ball bearings. Hardened and ground steel balls in a brass cage container run on ball races of hardened steel, perfectly ground to exact contour. The lower ball race rests on a spherical seat in the upper portion of the bearing housing, thus permitting the ball-bearing to adjust itself perfectly to the alignment of the parts, and placing an equal weight on all of the balls. Fig. 1008 shows an interior view of the splash chamber, which forms a protective housing around the upper portion of the thrust bearing. Adjusting nut and check nut are provided, so that exact adjustment of the vertical position of the impeller and moving parts within the pump casing may be made.

Buffalo Shaft or Guide Bearings:—Buffalo Shaft Bearings are of the same general design as the Buffalo Thrust Bearings, except the ball-bearing thrust is omitted.

Automatic Lubrication of Buffalo Thrust and Shaft Bearings:—A prominent feature of Buffalo Thrust and Shaft or Guide Bearings is the method used to constantly and automatically provide a flood of oil over the bearing surfaces without waste or drip. This is clearly shown in Fig. 995. A whirling oil chamber, made in two pieces, is clamped solidly and oil tight around the shaft just below the bearing proper. As the chamber rotates with the shaft, the oil it contains is carried under some pressure on the inside of the periphery of this chamber, being thrown outward by centrifugal force. A short oil tube projecting from the rigid housing of the bearing proper is bent slightly opposite to the direction of rotation at its outer end, and the end of the tube cut on a slight angle to assist it in picking up the oil rapidly whirling with the chamber. The oil readily enters the tube and with sufficient velocity to force the oil through the connecting pipe to the upper part of the bearing and it then flows downward over the bearing surfaces, assisted by ample oil grooves.

The use of a flood of fluid oil for high speeds is far superior to hard oil or grease.

Buffalo Vertical Shaft Centrifugal Pumps

Specifications

Casing and Side Plates: Cast Iron, machined to gauge, drilled to template. Close clearances with impeller, preventing leakage.

Suction: Bottom suction opening.

Impeller: Cast Iron, single suction, enclosed type.

Shaft: Open hearth machine steel accurately finished all over.

Shaft or Guide Bearings: Vertical type, automatically lubricated.

Thrust Bearing: Vertical ball bearing type, automatically lubricated. Mounted on pump in non-submerged type and just below motor or pulley frame in submerged type.

Gland: Cast Iron.

Couplings: Flanged and flexible as required by type of installation.

Finish: All pumps painted, filled and rubbed down. Bright parts exposed to weather protected by slushing compound.

Buffalo Class "A" Vertical Pumps

Single Stage—Bottom Suction

150 Feet Maximum Working Head

Code Word, Standard Submerged Pumps	Code Word, Standard Non-Submerged Pump	Figure Number		Size of Pump, Inches	Pipe Sizes, Inches		Capacity, Gallons per Minute	
		Standard Submerged Pump	Standard Non-Submerged Pump		Suction	Discharge	Normal	Maximum
MTCAW	MTENG	991	1012	1½	2	1½	55	75
MTCEX	MTERF	991	1012	2	2½	2	100	140
MTCIZ	MTESZ	991	1012	2½	3	2½	155	225
MTCOB	MTEVD	991	1012	3	4	3	225	325
MTCUC	MTEWL	991	1012	4	5	4	400	550
MTCYD	MTFAZ	991	1012	5	6	5	620	850
MTDAX	MTFEB	991	1012	6	8	6	900	1300
MTDIB	MTFOD	991	1012	8	10	8	1600	2000
MTDOC	MTFUF	991	1012	10	12	10	2500	3100
MTDUD	MTFYG	991	1012	12	15	12	3600	4500
MTDYF	MTGAB	991	1012	15	18	15	5500	7000

Add Code Word JCESF for Brass Impeller.

Add Code Word JCHBY for Brass Gland.

Add Code Word JCGMR for Monel Metal Shaft through Pump and Gland.

Add Code Word JCDRE for Sewage Type Impeller.

Buffalo Class "B" Vertical Pumps

Single Stage—Bottom Suction

100 Feet Maximum Working Head

Code Word, Standard Submerged Pump	Code Word, Standard Non-Submerged Pump	Figure Number		Size of Pump, Inches	Pipe Sizes, Inches		Capacity, Gallons per Minute	
		Standard Submerged Pump	Standard Non-Submerged Pump		Suction	Discharge	Normal	Maximum
MTHED	MTISD	991	1012	4	5	4	400	550
MTHIF	MTIWF	991	1012	5	6	5	620	850
MTHOG	MTIZN	991	1012	6	8	6	900	1300
MTHUII	MTJAD	991	1012	8	10	8	1600	2000
MTHVJ	MTJEF	991	1012	10	12	10	2500	3100
MTIFT	MTJIG	991	1012	12	15	12	3600	4500
MTIGZ	MTJOH	991	1012	15	18	15	5500	7000

Add Code Word JCESF for Brass Impeller.

Add Code Word JCHBY for Brass Gland.

Add Code Word JCGMR for Monel Metal Shaft through Pump and Gland.

Add Code Word JCDRE for Sewage Type Impeller.

SPEED LIMITS

Buffalo Vertical Class "A" Centrifugal Pumps

Size of Pump Inches	Normal Capacity Gallons per Minute	Speed	Revolutions per Minute for Total Heads of 10 to 150 Feet														
			10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'
1½	55	Min.	770	1020	1220	1380	1510	1630	1750	1850	1950	2040	2130	2210	2290	2360	2420
		Max.	1300	1650	1900	2100	2270	2400	2480	2550	2600	2660	2700	2730	2760	2780	2800
2	100	Min.	700	940	1110	1250	1380	1500	1600	1700	1790	1880	1960	2030	2100	2170	2230
		Max.	1170	1520	1770	1940	2080	2200	2300	2380	2450	2500	2550	2600	2630	2650	2650
2½	155	Min.	620	840	1010	1140	1260	1380	1470	1560	1650	1730	1810	1880	1950	2010	2070
		Max.	1100	1430	1680	1850	2000	2120	2080	2290	2360	2410	2450	2480	2490	2500	2500
3	225	Min.	570	760	910	1040	1150	1250	1350	1430	1510	1590	1660	1730	1790	1850	1900
		Max.	1000	1300	1550	1720	1860	1980	2210	2170	2240	2300	2340	2370	2390	2400	2400
4	400	Min.	500	660	800	900	1000	1100	1180	1260	1330	1440	1460	1520	1580	1630	1680
		Max.	620	870	1070	1240	1390	1520	1640	1760	1820	1900	1960	2000	2030	2050	2070
5	620	Min.	420	560	670	760	850	925	1000	1060	1125	1180	1230	1280	1330	1375	1420
		Max.	560	780	960	1120	1250	1370	1475	1560	1640	1710	1770	1820	1850	1880	1900
6	900	Min.	370	495	590	675	750	815	880	940	990	1040	1090	1130	1180	1220	1260
		Max.	500	735	910	1040	1150	1250	1330	1400	1465	1520	1570	1610	1645	1675	1700
8	1600	Min.	250	350	425	490	550	600	645	690	730	770	805				
		Max.	380	540	650	765	840	925	1000	1060	1110	1155	1190				
10	2500	Min.	240	320	380	430	475	510	550	585							
		Max.	310	440	510	565	615	660	700	740							
12	3600	Min.	180	265	320	365	405	445	475								
		Max.	280	345	400	450	500	545	590								
15	5500	Min.	180	250	305	350	390	425									
		Max.	240	320	380	430	475	510									

SPEED LIMITS

Buffalo Vertical Class "B" Centrifugal Pumps

Size of Pump Inches	Normal Capacity Gallons per Minute	Speed	Revolutions per Minute for Total Heads of 5 to 100 Feet												
			5'	10'	15'	20'	25'	30'	35'	40'	45'	50'	60'	70'	80'
4	400	Min.	750	890	1000	1120	1210	1300	1380	1460	1530	1600	1730	1850	1960
		Max.	880	1020	1250	1440	1580	1700	1800	1900	1980	2050	2180	2280	2370
5	620	Min.	650	780	900	1000	1070	1150	1220	1290	1350	1420	1530	1640	1740
		Max.	700	940	1130	1300	1440	1550	1650	1730	1810	1880	2000	2100	2180
6	900	Min.	580	680	770	860	930	1000	1060	1120	1180	1230	1340	1420	1520
		Max.	600	800	1000	1150	1270	1380	1470	1550	1630	1690	1800	1900	1980
8	1600	Min.	400	490	570	630	700	750	800	840	890	930	1000	1080	1140
		Max.	500	600	700	830	920	1010	1100	1170	1230	1300	1400	1500	1580
10	2500	Min.	380	460	510	570	620	660	700	740	790	820	880	940	990
		Max.	450	500	600	700	770	840	900	960	1020	1070	1160	1240	1300
12	3600	Min.	320	370	410	460	500	540	570	610	640	670	730	780	
		Max.	400	450	530	600	670	730	790	840	890	940	1010	1080	
15	5500	Min.	350	400	420	460	490	510	550	570	600	620	670		
		Max.	400	420	470	540	600	640	690	730	770	810	870		

In figuring Horse Power of Motor, allow ample margin for loss in shafting and bearings. Also allow for extra loss of power if shafting or couplings are submerged.

Diagrammatic Installations of Buffalo Vertical Shaft Centrifugal Pumps

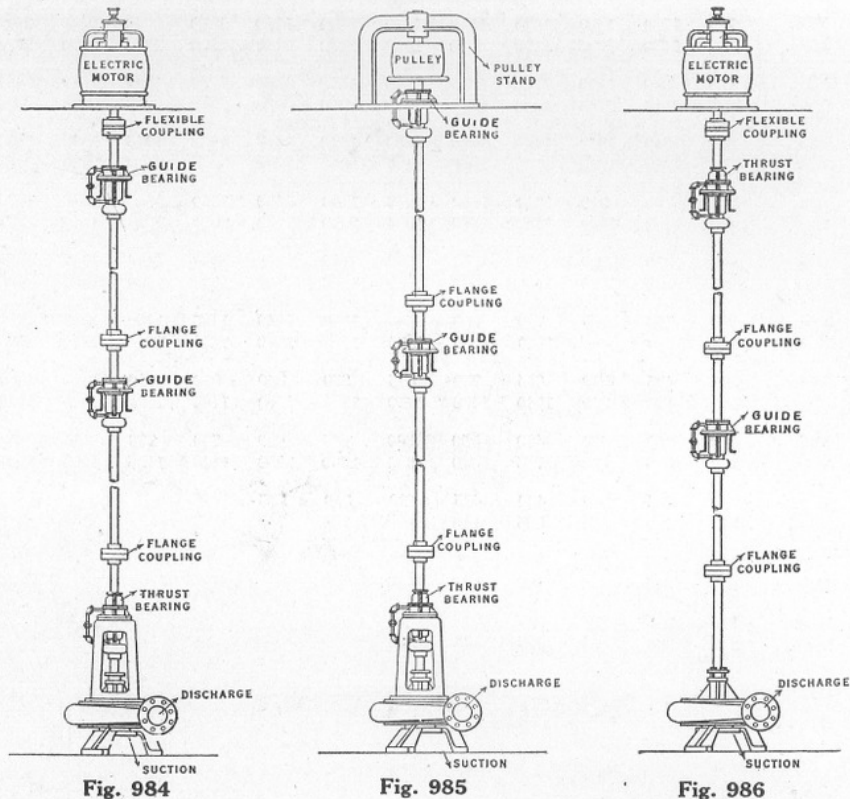


Fig. 984 direct connected to motor, thrust bearing to support weight of shafting, etc. mounted directly on top of pump, flanged suction inlet.

Fig. 985 pulley driven, thrust bearing mounted directly on top of pump, flanged suction inlet.

Fig. 986 direct connected to motor, pump built for submerging; regularly built with bell-mouth suction inlet, or will be furnished if desired with flanged suction inlet. Thrust bearing is located near the upper part of the shaft, supported on channel irons.

General Notes

Shaft or guide bearings should be placed each 6 or 7 feet on 3" and larger pumps, and each 5 feet on 2½" and smaller pumps. In Fig. 986 the thrust bearing acts as a guide bearing, just under the flexible coupling. It is necessary to locate a bearing directly underneath the flexible coupling in any installation.

On installations requiring extremely long, large diameter shafts it is advisable to divide the shaft into two or more sections, separated by a flexible coupling, and carry the weight of each section on an individual thrust bearing.

For direct connection of vertical shaft pumps to motors it is absolutely essential to connect motor shaft with pump driving shaft by means of flexible coupling as no portion of the weight of shafting, etc., must be thrown on the motor thrust bearing, which is designed to carry only the weight of the motor armature or rotor.

SCANNED BY: AEM OF LOCKPORT NY USA

POSTED ON: SEPTEMBER 27, 2016

EDITED BY: BRIAN D. SZAFRANSKI

ELMA, NEW YORK USA

COURTESY OF: WESTERN NY GAS & STEAM ENGINE ASSOCIATION

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